



**UNITED STATES DEPARTMENT OF COMMERCE**  
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/994,038	12/18/97	YAMAZAKI	S 07977/208001

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MM92/0703

EXAMINER

COLEMAN, W

ART UNIT

PAPER NUMBER

2823

DATE MAILED:

07/03/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

## Office Action Summary

Application No.

08/994,038

Applicant(s)

YAMAZAKI ET AL.

Examiner

W. David Coleman

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2001.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 7-10 and 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 11-14 and 16-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

### Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed April 24, 2001 have been fully considered but they are not persuasive.
2. Applicant's contend that Mizutani et al., U.S. Patent 5,043,785 herein known as Mizutani, does not teach a semiconductor device having a plurality of crystals extending in a crystal growth direction. Thus, when the charge transfer direction coincides with the crystal growth, the carriers can move continuously in the crystal semiconductor film. Applicant's further contend that Mizutani, FIGS. 7A to 7C show nuclei 72 formed and the nuclei are grown in mutually contacting islands, and a continuous film 73 is obtained by further growth (i.e. crystal growth proceeds from the nucleus in all the directions in each grain. Therefore, the carriers cannot move in only one direction in the continuous film 73.
3. In response to Applicant's contention that Mizutani teaches crystal growth in all directions, Applicant's claims do not preclude the crystal growth in all directions.
4. With respect to claims 16-23, Applicant's contend that Zhang et al., U.S. Patent 5,604,360 herein known as Zhang et al. fails to disclose a charge coupled device.
5. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941

(Fed. Cir. 1992). In this case, one of ordinary skill in the art would recognize that charge coupled devices that are taught by Mizutani can be incorporated into the Zhang teachings because the semiconductor materials involved in the Zhang teachings are sensitive to light and charged coupled devices are merely semiconductor materials sensitive to light.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-6 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizutani et al. U.S. Patent 5,043,785 in view of Funakoshi et al. U.S. Patent 5,650,644.
8. Mizutani (785) discloses a semiconductor device substantially as claimed. Pertaining to claims 1 and 2, Mizutani (785) discloses a photosensor device for photoelectric conversion, and more particularly a photosensor device for photoelectric conversion such as CCD (column 1, lines 10-15). In **FIG. 1**, a thin semiconductor film 2 of n-type or i-type is formed on a substrate. Pertaining to claim 3, the substrate 1 is composed of a transparent substrate such as quartz or glass if the device receives the light through the substrate. The first semiconductor film can be composed of polycrystalline silicon or monocrystalline silicon. Pertaining to claims 4-6 and 11-14, the semiconductor film of n-type or i-type is doped with a p-type impurity, in predetermined areas 4, 24, 14, down to the substrate. As will be apparent from the equivalent circuit shown in **FIG. 2**, the photosensor device of the present

embodiment is capable of switching the output from the photodiode 7 of high sensitivity with the high-speed MOS-FET 8 (column 3, lines 62-66). **FIGS. 7 and 7A**, conceptually

illustrates the growth of a plurality of large grain polycrystalline film on a SiO<sub>2</sub> film 71.

**FIG. 7A** shows a state in which nuclei 72 are formed; **FIG. 7B** shows a state in which the

nuclei are grown into mutually contacting islands; and **FIG. 7C** shows a state in which a

continuous film 73 is obtained by further growth, which is equivalent to Applicants

crystalline semiconductor film having a plurality of crystals extending in a crystal growth

direction. Also, it is the direction of incident light on the semiconductor device. However,

Mizutani (785) fails to disclose a plurality of photodetecting elements. Funakoshi (644)

discloses a plurality of photodetecting elements on the same substrate. See **FIG. 1a-1f**,

Funakoshi (644) discloses more than several rows of a horizontal charge coupled devices 27,

28 and 29 also known as HCCD and vertical charge coupled devices 31 known as VCCD. In

view of Funakoshi (644) it would have been obvious to incorporate a plurality of horizontal

and vertical photodetecting element which are merely charge coupled devices (CCD's) into

the Mizutani (785) semiconductor device to increase sensitivity, reduce design and

manufacturing cost of a CCD and improve charge transfer.

9. Claims 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. U.S. Patent 5,604,360 in view of Mizutani et al. U.S. Patent 5,043,785.

Zhang (360) discloses a semiconductor device substantially as claimed. See **FIGS. 2A-2D**.

**FIG. 1** is a top plan view showing a construction of a liquid crystal display of the embodiment of

the present invention in outline, wherein a picture element section 10 having a plurality of

picture element electrodes provided in matrix (not shown) and a peripheral circuit 20 as a driving

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circuit for driving each of the picture element electrodes are shown. A silicon oxide base film 102 is formed on a glass substrate, an amorphous silicon film 104 is arranged on top of silicon oxide 102. Crystal grows in a lateral direction (direction parallel to the substrate) from the region 100 as shown by arrow 105 in the peripheral region of the region 100. However, Zhang (360) fails to disclose a MOS capacitor for charge transfer. Mizutani (785) discloses a semiconductor device with a MOS capacitor. See FIGS. 3 and 4, an n-type semiconductor film 2 is doped with boron to simultaneously form P+ areas within a sensor area 4, source and drain areas 14, 24 and a MOS capacitance area 34. Then, after the formation of gate insulator films, a gate 16 of the MOS capacitance and a gate 6 of the MOSFET are formed. In view of Mizutani (785) it would have been obvious to incorporate a MOS capacitor in the Zhang (360) semiconductor device for photoelectric conversion.

10. Claims 17, 18 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. U.S. Patent 5,604,360 in view of Mizutani et al. U.S. Patent 5,043,785.

Zhang (360) discloses a semiconductor device substantially as claimed as discussed in claims 16 and 19 above. However, Zhang (360) does not disclose a quartz substrate or image sensor.

Mizutani (785) discloses a quartz substrate. In FIG. 1, a thin semiconductor film 2 of n-type or I-type is formed on a substrate 1. The substrate 1 is composed of a transparent substrate such as quartz if the device receives the light through the substrate. In view of Mizutani (785) it would have been obvious to incorporate quartz substrate in the Zhang (360) semiconductor device for use as an image sensor.

### *Conclusion*

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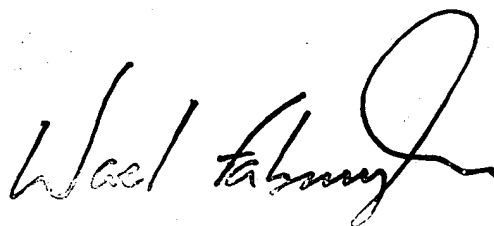
11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

12. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004. The examiner can normally be reached on 9:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7721 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



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WDC

June 28, 2001